Cement MILL SECTION of

Concrete

Vol. 24 APRIL, 1924 No. 4

Utilization of Waste Heat In Mexican Cement Plant

By A. B. Stewart

Superintendent La Tolteca Cia. de Cemento Portland, S. A.

The Republic of Mexico has five cement plants, with a total capacity of 5,000 bbls. a day. The present consumption of cement in the country is only about 2,500 bbls. a day, and this includes a certain amount of cement imported to points on the Atlantic and Pacific coasts, which the native plants are unable to reach owing to prohibitive freight rates.

The plant of the Cia. de Cemento Portland, "La Tolteca," with a maximum capacity of 1,800 bbls. per day, supplies about 40% of the total amount of native cement used in the country.

This plant is situated in the State of Hidalgo, 48 miles from Mexico City, and served by the Mexico-El Paso line of the Mexican National Railways. Construction work was begun in 1910, and although the history of Mexico from that year up to the present time has been a monotonous record of revolution and counter-revolution, the yearly production of the plant has been steadily increasing.

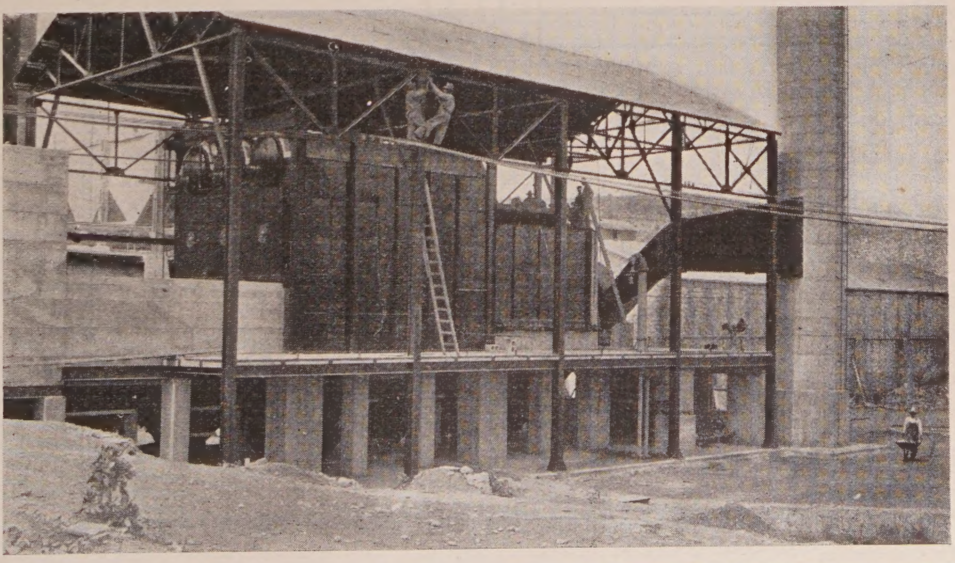
The dry process is used, and Mexican oil burned in kilns and dryers. The limestone quarry is about three miles from the plant, electric haulage being used. The clay deposit is distant only a few hundred feet, the clay being handled to the storage by gravity in 1½-cu. yd. side dump cars.

The plant is electrically operated throughout, and, until the placing in operation of the generating plant utilizing the gases from a 10-ft. x 150-ft. rotary kiln, in December, 1922, electric power was furnished by the Mexican Light and Power Co. from a nearby hydro-electric plant at 22,000 volts. Power from this source is still available when required.

La Tolteca Cement Plant

Before describing the waste heat generating equipment and operating experience in greater detail, a short, general description of the cement plant will be given.

Fig. 1—View of Boiler, Economizer Fan and Concrete Stack at Plant of La Tolteca Cia. de Cemento Portland



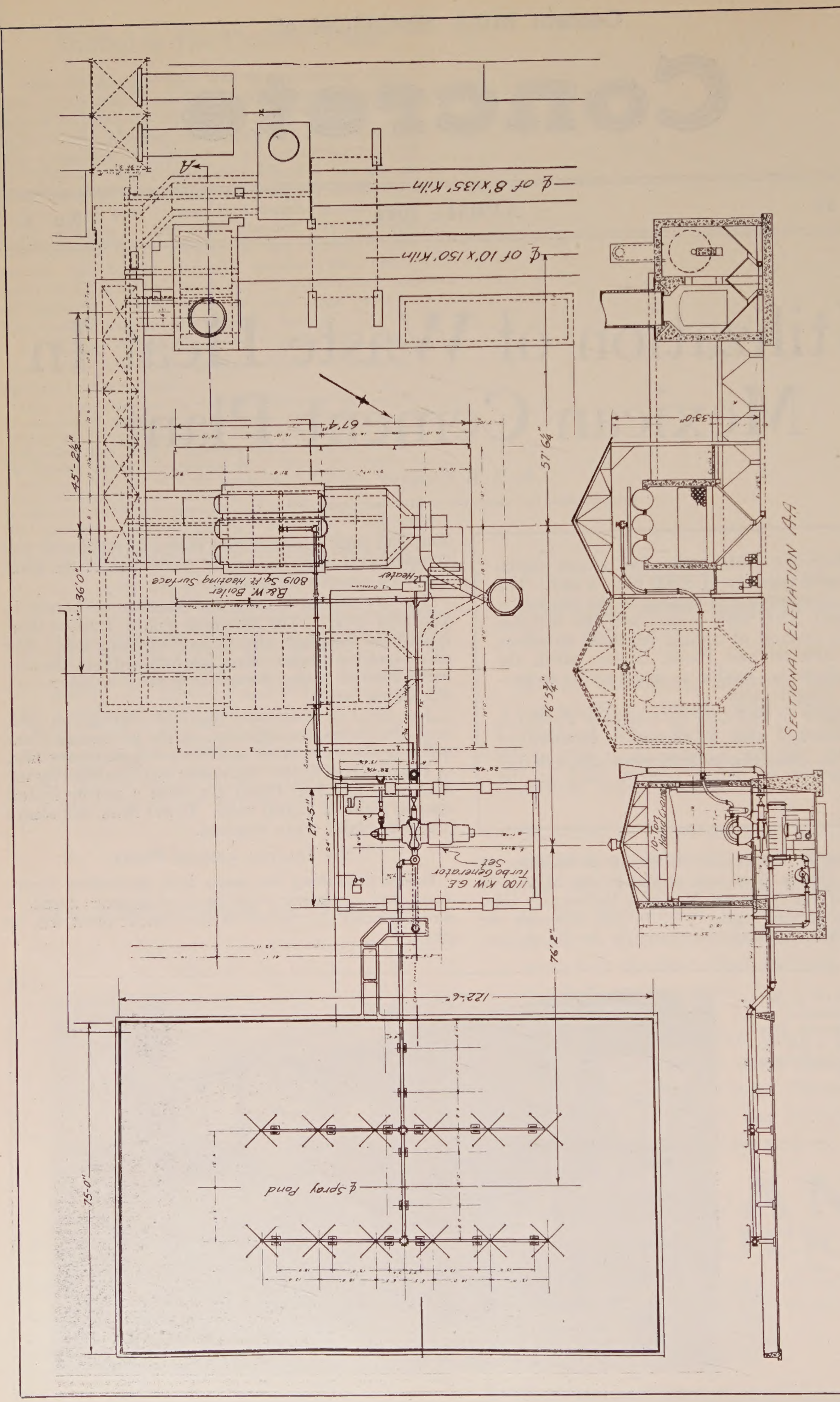


Fig. 2—General Layout, Plan and Sectional Elevation, Waste Heat Power Plant

Fig. 4—Concrete Connecting Flue During Construction

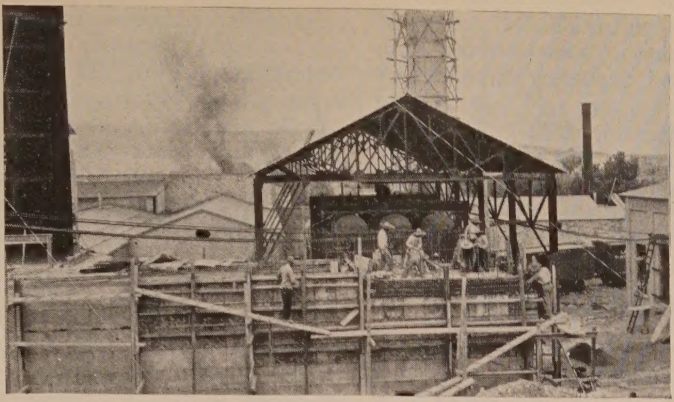
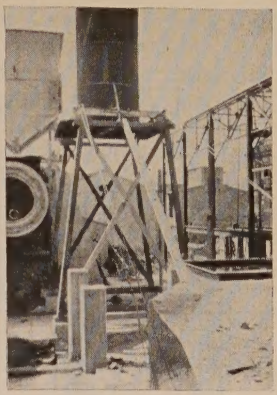


Fig. 5—(Right) Stack Supported on Trestles and with Original Stack Chamber Demolished



The limestone-crushing plant consists of a single No. 6 Gates gyratory crusher[1] (Allis-Chalmers), the discharge from which is elevated to a 48-in. Gates pattern revolving screen,[1] oversize from this screen is returned to 32-in. x 16-in. Sturtevant rolls, and hence to limestone storage bins without drying. The clay is discharged from storage into a 9-ft. pan mill, and thence to any of three Ruggles-Coles, Class A-10 dryers.[2] At this point the dried clay and limestone are proportioned and mixed by means of suitable weighing hoppers discharging to a common screw conveyor. Preliminary grinding of the raw material is effected in two Smidth No. 85 kominuters,[3] and secondary grinding in four Allis-Chalmers 6-ft. x 22-ft. tube mills,[1] with silex linings and spherical or cylindrical iron-grinding media. The kominuters have an hourly output of about 66 bbls., with a power consumption of 1.45 k. w. h. per bbl. The tube mills have an output of 51 bbls. per hour, with a power consumption of 3. 86 k. w. h. per bbl. The raw mix is ground to a fineness of 84% through 200 mesh screen.

Two rotary kilns[1] are installed, both of Allis-Chalmers manufacture, one 8 ft. x 135 ft. and the other 10 ft. x 150 ft. At present only the last mentioned is connected to the gas flue and waste heat boiler, though construction is now in progress to connect the 8-ft. x 135-ft. kiln to the gas flue also. As mentioned before, the kilns are oil fired, the smaller has an output of about 600 bbls., and the larger of about 1,000 bbls. per day. These outputs can be increased at the expense of fuel consumption. No coolers are installed in connection with these kilns, but ample open-air storage for clinker cooling is available. The hot clinker from the kilns and weathered clinker to the finish mill is handled by means of an Orton and Steinbrenner 15-ton steam-operated, standard-gage locomotive crane[4] with 1½ cu. yd. bucket.

The finish mill is an almost exact replica of the raw mill, except that the tube mills in the former case have cradle feeders and in the latter spider feeders. The kominuters in the finish mill have an hourly output of about 70 bbls., with a power consumption of 1.32 k.w.h. per bbl, and the tube mills grind 29.4 bbls. per hour of cement, with a fineness of 84% to 85% through 200 mesh screen, with a power consumption of 5.25 k.w.h. per bbl.

The immediate construction program includes the substitution of the present rather inadequate rectangular cement storage bins and packing arrangements for reinforced concrete silos and Bates packers.[5]

The total power consumption, including electric traction to limestone quarry, pumping, machine shop, lighting, etc., is 18.5 k.w.h. per bbl. In this connection it should be mentioned that, in view of the fact that steam considerably in excess of requirements is usually being generated with the waste heat boiler, little attempt to economize power is practiced.

The general lay-out of the waste heat generating plant, which was designed and erected by the company's own staff, is shown in plan and sectional elevation in Fig. 2. As mentioned previously, at the present time only the 10-ft. x 150-ft. kiln is connected to the boiler. One boiler and one generating unit only are installed; the general lay-out plan (Fig. 2) shows that provision has been made for the subsequent addition of another boiler, and the power house can easily be extended towards the north to accommodate an additional turbo-generator and its auxiliaries.

Before deciding on the lay-out to be adopted, the pros and cons of the long and short connecting flue were carefully considered, and all available authorities consulted. The proportions of the flue finally decided upon and shown in Fig. 3 have justified their selection. Very satisfactory dust precipitation is obtained, and the radiation loss is not excessive. From 8 in. to 12 in. of concrete heavily reinforced, with a minimum of 9 in. of firebrick lining was the form of construction adopted both for the main gas flue and the reconstructed kiln stack chamber. An interesting detail of construction was the supporting of the stack on trestles and the demolition of the old original stack chamber and construction of the new one while the stack was "in the air." This stage of construction is illustrated in Fig. 5. Steel hoppers, lined with firebrick and discharging into screw conveyors, are provided for dust collection along the entire gas circuit from kiln to economizer. The conveyor boxes are of concrete, and, in spite of the fact that the dust is red hot, no trouble with conveyors or conveyor boxes has been experienced. The dust is elevated and returned to the kiln periodically.

The question of a suitable kiln seal to exclude the entrance of cold air into the stack chamber received a good deal of consideration, and the form finally decided upon was designed by the engineers of the Associated Portland Cement Manufacturers, Ltd., of Great Britain, and has given entire satisfaction. Sealing the end of the kiln has not resulted in burning of cast iron retaining ring, feed pipe or the end of the kiln itself, though a certain amount of trouble from this cause was anticipated.

Reference to Fig. 3 will show the provision made for dampers to be inserted under the kiln stack base plate. The sectional dampers were first made of cast iron heavily ribbed; these lasted fairly well but eventually sagged, making removal difficult. The dampers are now made of lean reinforced concrete, using vol-

---

[1] Allis-Chalmers, Milwaukee, Wis.

[2] Ruggles-Coles Engineering Co., 50 Church St., New York City.

[3] F. L. Smidth & Co., 50 Church St., New York City.

[4] Orton and Steinbrenner, 610 S. Dearborn, Chicago, Ill.

[5] Bates Valve Bag Co., 7310 So. Chicago, Chicago, Ill.

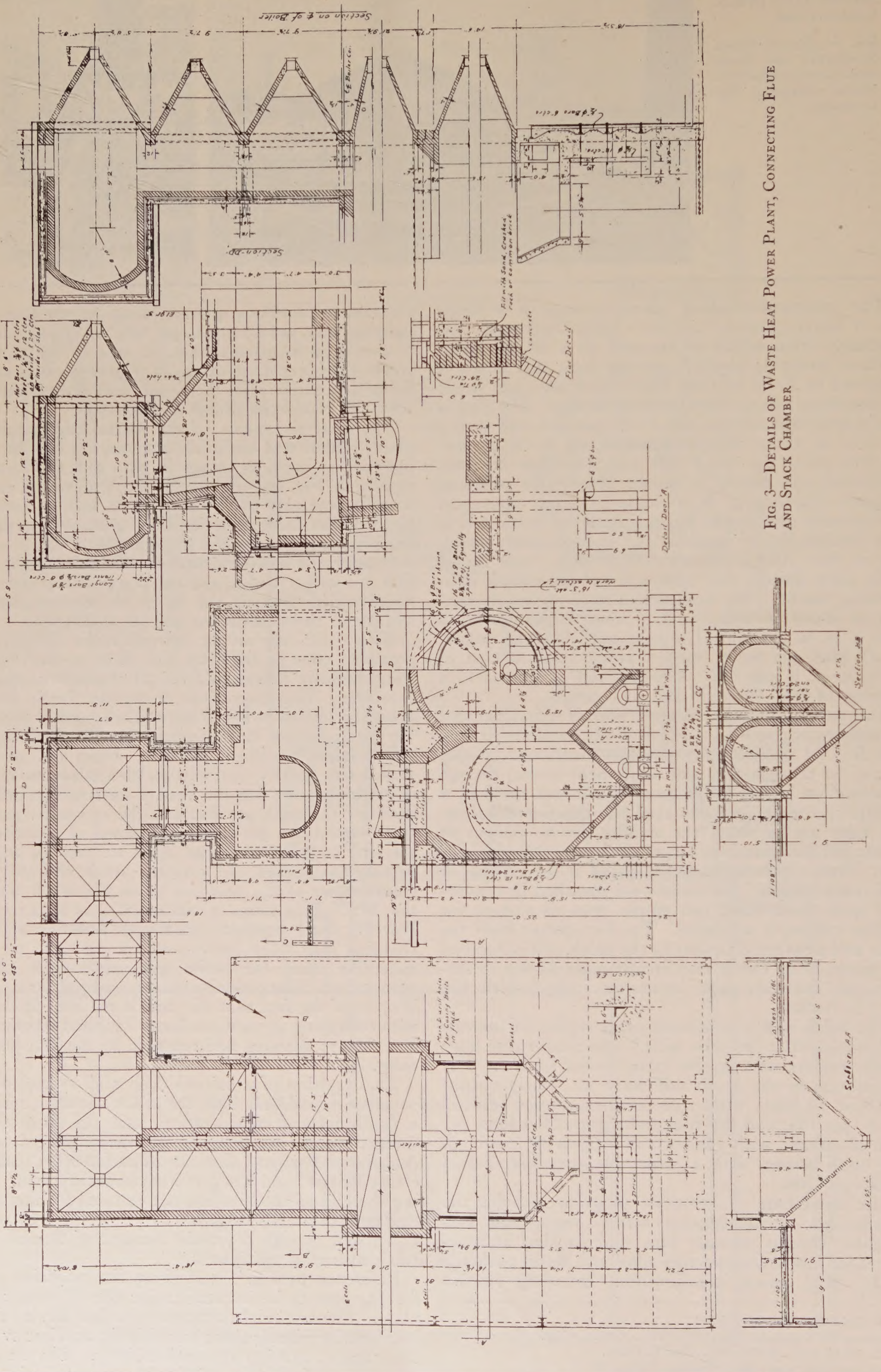


FIG. 3—DETAILS OF WASTE HEAT POWER PLANT, CONNECTING FLUE AND STACK CHAMBER

canic rock as aggregate, and indications at present are that these last just about as long as the cast iron ones, if not longer, and are very much cheaper. The dampers are made sectional, in order to facilitate insertion and removal. After insertion, the joints between sections are plastered up with clay, and an access door is provided at the base of the stack, above the dampers, to permit this.

The boiler was furnished by the British Babcock & Wilcox Co., of Renfrew, Scotland, and is 30 sections wide and 12 high, baffled for four passes. The heating surface is 8,019 sq. ft. The three drums are 54 in. in diameter, and the working pressure is 200 lb. per sq. in. The middle drum is equipped with Turnbull's high- and low-water alarm, which in practice has been found to have none of the disadvantages of alarms fitted in water columns. Except for the location of the superheater, this boiler does not depart much from the standard boiler practice of the Babcock & Wilcox Co. in Great Britain. On account of the low gas temperature in waste heat practice, the superheater is placed further forward, or, in this case, at the top of the first and second pass. The more usual position in an oil or coal-fired boiler is indicated in Fig. 6 by the blind nipples in the drums at the top of the fourth pass. The superheater, which has 970 sq. ft. of heating surface, was designed for 100° F. superheat, but in practice has been found to give nearer 150°, owing to gas temperatures realized being considerably higher than originally expected. The boiler and economizer setting are both enclosed in steel casing, but it is questionable whether this practice is altogether desirable, as it is much easier to deal with air leakage through an exposed setting. The economizer was furnished by the Green Fuel Economizer Co., Wakefield, England, and consists of 320 vertical cast-iron tubes, 4 in. x 9 ft., with a total heating surface of about 2,230 sq. ft. It has not been found necessary to run the mechanical scrapers continuously, as provided for by the makers; in practice it has been found sufficient to operate the scrapers by hand a few minutes in each shift. An ingenious method of sealing the scraper chain apertures against the influx of air has been provided. The total heating surface of boiler, superheater, and economizer is about 11,219 sq. ft., and the normal evaporation is about 1.8 lb. per sq. ft. of combined heating surface, or approximately 20,000 lb. of steam per hour.

The 60-in. diameter Sirocco induced draft fan was furnished by Davidson & Co., of Belfast, Ireland, and handles, at present normal conditions, about 85,000 lb. of gases per hour, at a temperature of 360° to 400° F. This fan is operated by a constant speed induction motor through a rope drive which was adopted primarily in order to facilitate experiments to ascertain the most suitable fan speeds; it is intended eventually to substitute a direct drive with variable speed motor. The fan at present runs at 675 r.p.m., and consumes from 80 to 100 h.p. The fan is equipped with dampers in both suction and discharge side, and the kiln draft is regulated by means of the latter. The fan discharges to a reinforced concrete stack, 6 ft. 6 in. inside diameter and 85 ft. high. The stack is unlined.

For boiler feeding, two Worthington outside packed pot valve 9 in. x 5 in. x 10 in. steam pumps[6] are installed, only one pump being kept in operation at a time. The pumps exhaust to a 600 h.p. Stillwell open type feed water heater[7] with trapped overflow and oil separator. The exhaust from the pumps being sufficient to heat the feed water entering the economizer to about 95° F. only, live steam is also admitted to the heater at about 5 lb. pressure through two Mason reducing valves,[8] the first reducing from 200 to 100 lb. and the second from 100 to 5 lb. The heater is equipped with a back pressure valve set at about 5 lb. Pressure-reducing valves could be obtained to reduce from 200 to 5 lb., but, as steam at a lower pressure than 200 lb. was desirable for certain purposes not connected with the waste heat plant, atomizing oil for instance, it was considered preferable to make the pressure reduction to 5 lb. in two stages. These pressure-reducing valves have given no trouble whatsoever. When the heater is drawing live steam in addition to exhaust steam from the feed pump, the temperature of the water entering the economizer is usually from 195° to 210° F.

Steam is conveyed to the power house through a 7-in. line. For the time being, and until another similar boiler is installed, expansion of the pipe is provided for by the horizontal and vertical long sweep bends shown in Fig. 2.

The generating equipment consists at present of a single General Electric 3,000 r.p.m. 18 stage, condens-

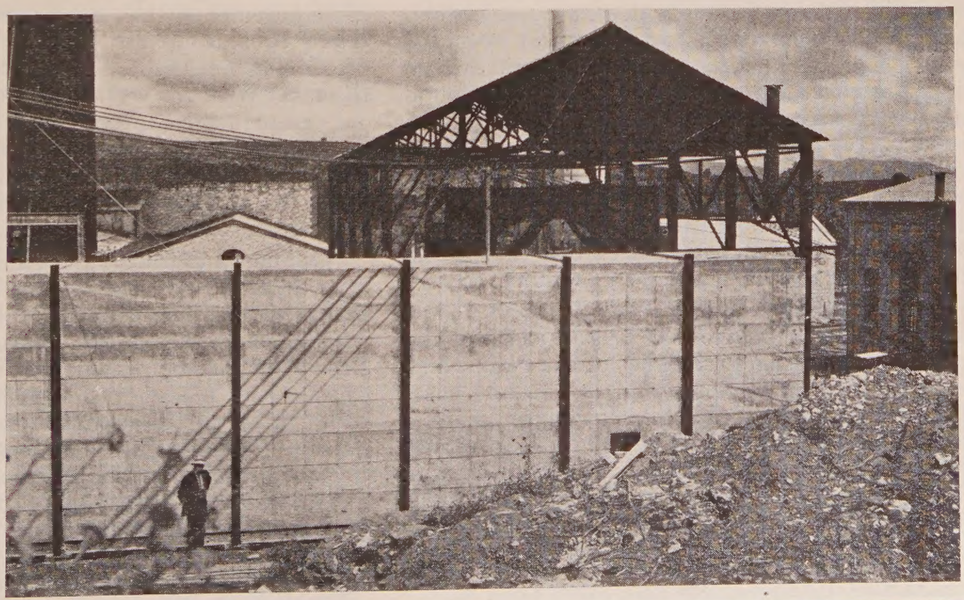
---

[6] Worthington Pump & Machinery Corp., 115 Broadway, New York City.

[7] Platt Iron Works Co., Dayton, Ohio.

[8] Mason Regulator Co., Boston, Mass.

Fig. 7—Finished Concrete Flue



ing, Curtis turbogenerator set[9] with type ATB 1375 k.v.a., 1,100 k.w. 80% p.f., 440 volt three phase generator with direct connected exciter. The switchboard equipment consists of a Tirrell regulator[10] and the usual complement of indicating and integrating meters. The condensing equipment, furnished by the Worthington Pump and Machinery Co., consists of a 2,700 sq. ft. surface condenser, 11-cu. ft. two stage steam air ejector, 10-in. motor driven circulating pump and 2-in. motor driven hotwell pump. The power house is equipped with a 10-ton hand operated traveling crane.

The spray pond equipment[11] to cool 2,500 gal. per minute is the standard Spray Engineering Co.'s design, with walls, floor and pipe-supporting columns of concrete.

The waste heat plant was placed in service in December, 1922, and over a year of operation has not disclosed any inherent defects in the layout as originally designed, nor have any serious difficulties in operation arisen. Naturally certain details have been modified in the light of experience, and certain additional equipment, described later, is now on order or being installed.

A certain amount of cracking of the concrete portion of the stack chamber and gas flue was anticipated, due to expansion of the fire-brick lining. At certain points cracks have appeared, though, in general, it may be said that the reinforcement provided has been sufficient to distribute these. Where concentrated cracks have appeared, these have been stopped with a mixture of shred asbestos and tar.

One of the earliest difficulties encountered was excessive superheat, due to the fact that the gas temperature entering the boiler was considerably higher than that expected. The builders arranged the superheater for entering temperature of about 1,200° F., whereas, without any serious attempt to limit air leakage, 1,400° to 1,500° F. is the normal temperature of the gases entering the boiler. The 10 ft. x 150 ft. kiln is proportionately rather short, tending to high gas temperatures and high fuel consumption per barrel of clinker, though, in general, desirable from the waste heat standpoint. It is not likely that the 8 ft. x 135 ft. kiln, when connected to the boiler and operating alone, will give gas temperature entering the boiler in excess of 1,200° F. Gauge pressure of 200 lb. and 100° F. superheat gives a steam temperature of about 482°, and the boiler and superheater were arranged for this condition, but, in practice, the usual steam temperature at the superheater outlet is around 540° F., or about 158° of superheat. In order not to get a dangerous steam temperature at the turbine, which is equipped with cast-iron diaphragms, it was found necessary to remove all pipe covering from the 7-in. main steam line. It is now proposed to cut out about 25% of the superheater tubes and substitute short nipples from top to bottom superheater boxes, thus reducing heating surface without reducing the steam flow area. It is anticipated that with this change less than 100° superheat will be obtained with the 8 ft. x 135 ft. kiln in operation only.

A certain amount of trouble is still occasionally experienced from caking or slagging of the dust which then hangs up in the hoppers and in extreme cases chokes up the first pass of the boiler, causing a gradual loss of draft at the kiln. This condition is generally due to poor combustion, resulting in carbon monoxide flame, and the more CO present in the gas, the further down the flue this flame will burn, but, owing to the air leakage from hopper spouts, poke holes, etc., only in extreme cases will the CO reach the boiler unconsumed. Attention to correct draft conditions and routine gas analysis, principally for the presence of CO, will usually overcome this trouble. The condition of combustion in the flue, and even in the first pass of the boiler, is also indicated by pyrometers showing an increase in temperature along the flue, instead of the normal decrease due to radiation and the influx of cold air through hopper spouts, etc. Even with normal conditions there is likely to be a certain amount of hanging up of the dust in the hoppers, particularly those nearest to the kiln, due to caking, and this has been remedied to a certain extent by the addition of poke holes suitably arranged in the sides of the hoppers. Hopper spouts, access doors, poke holes, etc., are hard to keep air tight and their excessive multiplication should be avoided.

From the commencement of operation it has been the practice in this plant to blow the dust off the tubes with an air lance rather than with steam. It was considered that there was a possibility of trouble from corrosion set up by sulphurous gases in the presence of moisture introduced through a cold steam lance. At first about 60 lb. pressure only was available and found to be inadequate, but for some months past 85 to 100 lb. pressure has been in use, and is sufficient to keep the tubes clean.

After about a year of operation, the blades of the exhaust fan are showing considerable erosion, and the indications are that all will have to be replaced within a few months. Indications are also that a slight change in the curvature of the fan blades will probably reduce the erosion without appreciably reducing the efficiency of the fan.

A certain amount of corrosion above the water line in the boiler drums, and also in steam pipes, was noticed at the beginning of operation, and degeneration of the feed water is under consideration, but, as an immediate measure, increasing the temperature of the feed water by the addition of live steam to the Stillwell heater[7] was tried, and the corrosion seems to be very much reduced. Painting the inside of the drums with kerosene and graphite seems to be effective in mitigating drum corrosion. No gas corrosion has been noticed so far, either in the boiler or economizer, but immunity from gas corrosion would appear to be largely a question of eliminating moisture from leaking tubes and header caps.

The steam generated is generally so much in excess of requirements that no particular pains have been taken to seal up air leaks. With conditions as at present, air leakage only represents additional load on the fan. With the 8-ft. x 135-ft. kiln in use, and lower gas temperatures entering the boiler, reduction of the air leakage to the practical minimum may be imperative. The leakage is chiefly around the sheet iron slide doors in the hopper spouts, poke holes in the hoppers and through dusting and access doors.

Base metal thermocouples and Ellison and "U" tube type draft gages[12] are installed in the stack chamber and at various points in the boiler, economizer and fan. Thermocouple leads are connected to a multipoint Brown indicating pyrometer[13] in the boiler operator's cabin. Any tendency to caking of dust on the boiler tubes or in the economizer can be detected by comparison of draft gage readings and dealt with before the conditions becomes serious. Dust is apt to build up round the thermocouple protecting tubes, introducing a considerable lag in the indications. It is advisable to clean off the caked dust periodically by

---

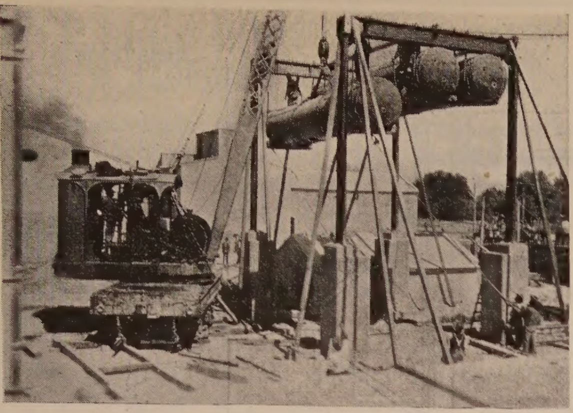
[9] General Electric Co., Schenectady, N. Y.

[10] Tirrell Gas Machinery Lighting Co., 103 Park Ave., New York City.

[11] Spray Engineering Co., 60 High, Boston, Mass.

[12] Lewis M. Ellison, 214 W. Kinzie St., Chicago, Ill.

[13] Brown Instrument Co., Wayne & Windrim, Philadelphia, Pa.



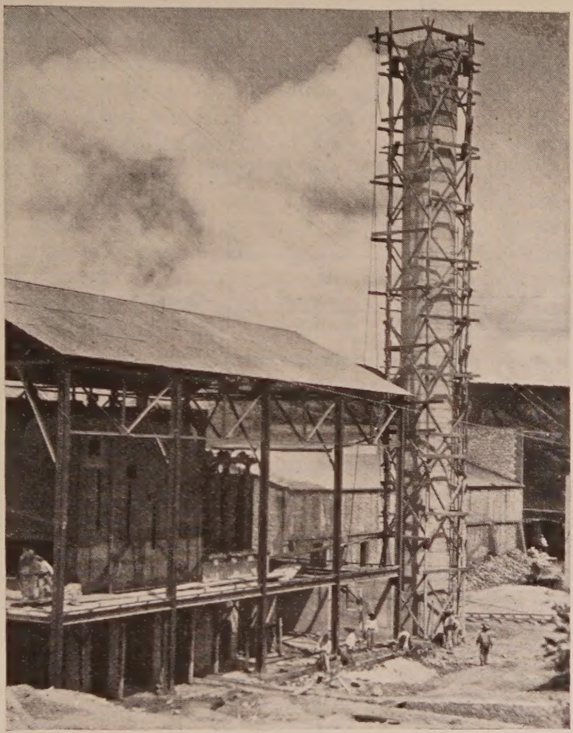


Fig. 8—Putting the Drums up with Locomotive Crane

Fig. 9—Concrete Stack During Construction. Built with Steel Forms

a back and forward movement of the thermocouple and tube through the setting. Iron and even nickel chromium protecting tubes have rather a short life at temperatures around 1,400° F., and particularly so in the atmosphere in the stack chamber.

The limiting feature as regards time of operation without shutdown of this single unit plant is the condition of the condenser. The spray pond is an efficient dust precipitator, and about once every three weeks, or one month (largely depending on the direction of the prevailing winds), it is necessary to shut down for 24 hours or so to clean the accumulated mud (precipitated raw mix and cement dust) out of the water boxes and condenser tubes, also to clean out the mud in the spray pond. As a partial remedy for this trouble, a Worthington tube washer, designed for cleaning out tubes with a jet of water under 250 lb. pressure while the condenser is under full load and vacuum, has been ordered. The necessary water pressure will be furnished by the boiler feed pump not at the time performing its normal function. It is realized that this device, at best, will only be a palliative. The real remedy for this condition, where the spray pond is the only feasible method of cooling the circulating water, appears to be dust prevention round the plant, which from every other standpoint also is very desirable.

The generator is of the forced ventilation type. The heated air is discharged outside the power house building and the cool air drawn from the inside. Generally it would be preferable to draw the cool air from the outside also, as the presence of very small quantities of oil vapor, not always avoidable round steam turbines, is apt to make the generator windings greasy, and the dust that eventually accumulates is harder to remove in consequence, also the outside air will generally be cooler. In the early days of operation of this plant, the accumulation of greasy dust in the generator windings and ventilating ducts was the cause of some concern. The elimination of an oil leak from the valve operating mechanism of the turbine, which dripped onto the steam chest where it was vaporized, stopped this trouble, and though dust still accumulates on the generator windings, it is dry and easily blown off with compressed air. A Spray Engineering Co. Type "A" 6,000 cu. ft. air washer is now being installed.

As an illustration of the normal boiler operating conditions an average of all hourly pyrometer and draft gage readings over a period of 144 hours is given below.

Degrees Fahrenheit							
Entering Flue	Entering Boiler	Top of Pass 1 & 2	Bottom of Pass 2 & 3	Top of Pass 3 & 4	Entering Economizer	Entering Fan	Superheat
1,560	1,380	930	670	590	535	390	166

The draft conditions during the same period averaged as follows:

Inches of Water				
Firing end of kiln	Feed end	Bottom of Pass 2 & 3	Top of Pass 3 & 4	Fan Inlet
0.05	0.20	1.0	1.4	2.4

The load carried by the turbine during this period, including auxiliaries, was 143,540 k.w.h., equivalent to an average indicated load of about 1,000 k.w. The output of the kiln during the same period was 6,168 bbls. There being no metering device in the feed water circuit or steam flow indicator in the main steam line, the evaporation can only be estimated, but the following assumptions are probably not very far out:

Turbine	16,000 lbs. per hr.
Air Ejector	600 lbs. per hr.
Feed Pumps and Heater	1,500 lbs. per hr.
Steam for atomizing, kiln and dryers	2,000 lbs. per hr.
Popping off, blowdown, leakage, etc.	350 lbs. per hr.
Total	20,450 lbs. per hr.

As mentioned previously, the output of the kiln in the six days under review was 6,168 bbls., or 1,011 bbls. per day, equal to 42.1 bbls. per hour. Assuming the hourly steam consumption at 20,000 lb., the evaporation per bbl. of clinker would therefore be:

$$\frac{20{,}000}{42.1}=475.$$

It is believed that the estimated steam consumption is, if anything, on the low side, and that the above evaporation is now being obtained, and, should the necessity for a higher rate of evaporation arise, could be considerably improved by close attention to reduction of air leakage.

The total output of the generator in k.w.h. up to

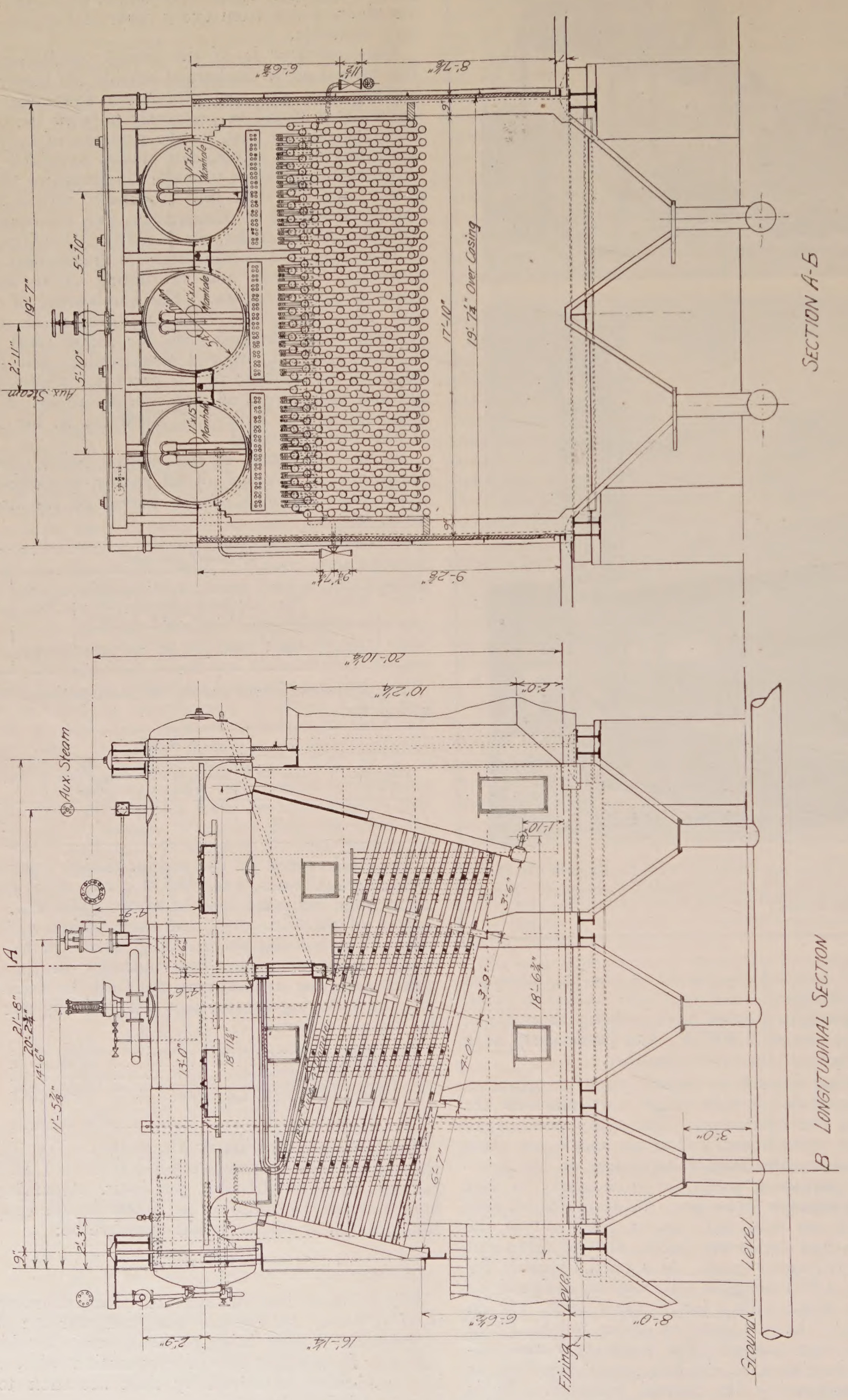


Fig. 6—Arrangement of Boiler Fitted with Superheater

the time of writing has been divided in the following proportion:

Useful load..................	86.7%
P. H. Auxiliaries.............	13.3%

The power house auxiliaries that are metered separately as such are: exhaust fan, circulating pump, condensate pump, power house and boiler house lighting. The electrically driven air compressor used for blowing off tubes and the screw conveyor and elevator motor for returning dust from the hoppers to the kiln are not considered as power house auxiliaries.

The dust collected in the hoppers and returned to the kiln has been the means of reducing the raw mix per bbl. from 685 lb., the average for many months before placing the waste heat plant in operation, to 604 lb., the average for the last year.

Before the placing in operation of the waste heat plant, steam for atomizing kilns and dryers was obtained from a 75-h.p. Babcock & Wilcox oil-fired boiler. This boiler is now only fired up when the waste heat boiler is not in operation. The saving in fuel oil from this cause alone is considerable.

With one boiler, one kiln connected thereto and one generating unit only, it is obviously impossible entirely to dispense with an auxiliary source of power. Kiln linings must occasionally be patched or partly renewed, the boiler and condenser must frequently be washed out. In the case of the plant under review, and owing to inadequate cement storage, production has to be continued with purchased power during the time that the waste heat plant is out of commission. It has not, however, been found necessary to use the waste heat power and purchased power simultaneously, the former is more than sufficient for the plant requirements.

During the last 13 months, from January, 1923, to January, 1924, inclusive, the total power consumption, exclusive of power house auxiliaries, has been as follows:

Month	Purchased power k.w.h.	% of total power	Waste heat power k.w.h.	% of total power
1923, January......	73,920	24.0	231,180	76.0
February..........	24,600	7.8	290,350	92.2
March............	164,640	33.8	322,820	66.2
April..............	73,440	16.0	389,830	84.0
May..............	117,000	22.4	405,370	77.6
June..............	35,160	7.0	464,490	93.0
July..............	75,960	15.6	410,780	84.4
August...........	61,440	12.5	430,710	87.5
September........	58,440	11.0	466,620	89.0
October..........	37,080	6.5	529,850	93.5
November........	54,600	11.0	438,480	89.0
December.........	20,280	4.7	413,510	95.3
1924, January......	35,160	7.5	433,710	92.5
	831,720	13.6	5,227,700	86.4

The fact that the experimental stage of operation of this single unit plant, with consequent inevitable lack of service continuity, is entirely included in the period of 13 months, is evidence of the practical reliability of waste heat power generation in connection with dry process cement kilns. The fact that not a single employee of this plant has had previous experience with waste heat boilers, and all the operators are Mexicans with no previous experience with boilers, turbines or generators of any kind, is additional evidence of this reliability.

A statement follows showing the cost of power generated with waste heat, including maintenance and repairs, but not depreciation of the plant. The costs include salaried supervision, boiler tenders and power house operators, cost of routine gas analysis determinations, also personnel employed in the return of dust collected in the hoppers to the kiln. Had purchased power been used exclusively the cost would have been 1.2 cents U. S. currency per k.w.h.

Cost in U. S. Currency

Month	Labor and Supervision	Materials	Total	Net. k.w.h. Generated	Cost per k.w.h.
1923, January....	$ 772.14	$ 198.88	$ 971.02	231,180	0.420¢
February........	900.64	121.55	1,022.19	290,350	0.352
March..........	907.08	206.24	1,113.32	322,820	0.345
April...........	696.01	182.45	878.46	389,830	0.225
May............	750.80	253.58	1,004.38	405,370	0.248
June...........	707.53	186.10	893.63	464,490	0.192
July............	927.51	190.47	1,117.98	410,780	0.272
August..........	925.34	225.62	1,150.96	430,710	0.267
September.......	634.28	174.51	808.79	466,620	0.173
October.........	753.04	314.50	1,067.54	529,850	0.201
November.......	850.18	84.71	934.89	438,480	0.213
December.......	709.53	119.73	829.26	413,510	0.200
1924, January....	660.46	55.99	716.45	433,710	0.165
	$10,194.54				0.1950¢
		$2,314.33		5,227,700	0.0443
			$12,508.87		0.2393

Doubly Burned Cement

Monsieur C. Didier claims to have secured a great improvement in the quality of cement by dividing the burning into two stages. The cement-mix is first heated to a temperature just sufficient to drive off all the carbon dioxide. The product is then hydrated, so as to produce an impalpable powder, and the latter is sieved and then burned as usual in a rotary kiln, or it is briquetted and burned in a shaft kiln. The process is considered to be specially advantageous where the cement is made from a hard limestone and a wet clay in a moist climate, so that dry grinding of the raw materials is impracticable. In Monsieur Didier's process, the lightly calcined limestone or chalk does not need to be ground, as it falls to powder when mixed with the wet clay, simultaneously drying the latter. The saving effected in the power otherwise required for grinding is sufficient to make the process worth consideration, but in addition to this the process removes much useless material from the stone prior to the second burning and so produces a better cement.

A particularly interesting application of this process is to hydraulic limestones corresponding roughly in composition with the raw mix of portland cement. If such materials are burned at a sufficiently high temperature, they form natural cements, but these are usually inferior to portland cement, because few natural materials are as homogeneous as those which have been mixed artificially. The first burning is at too low a temperature to cause the complete formation of the desired compounds of lime and silica, but a large part of such combination does occur, and during the slaking which follows, these compounds are reduced to powder, whilst the inert impurities remain in a coarser form and can be separated by sieving.

This method of "double-burning" has been in use for more than a year at the Usines Valette-Viallard at Cruas, with complete satisfaction. The process separates inert and useless material at an early stage. Under some conditions, this material is a kind of grappier, and may be used for "grappier cement." The quality of the cement produced in the second burning is superior to that produced by a single burning, because some of the impurities are removed and the materials are better mixed. The additional cost is not serious, and is readily paid by those who realize the advantage of a superior cement.

When required, the works can burn lime as well as produce cement, as the product of the first burning can, with a suitable stone, be a first-class lime. Incidentally, the sale of this lime in a hydrated state is very profitable.—*Revue de Materiaux.*

From a translation in *Concrete & Constructional Engineering.*

Lime Production in 1923

About 4,057,000 short tons of lime, valued at $39,413,000, were sold in the United States (including Hawaii and Porto Rico) in 1923, according to an estimate made in the Department of the Interior, by the Geological Survey, from preliminary reports received from the principal producers. This quantity is more than 11% greater than that sold in 1922, and only slightly less than that sold in 1916, the year of largest recorded production. The average value per ton in 1923 is estimated at $9.70. In 1922 it was $9.14. Of the 42 states and territories that produced lime in 1923, 16 showed a decrease and 26 an increase in output as compared with 1922. Nearly all the States that showed decrease in 1923 are small producers or larger producers that serve local markets or that supply a demand for special lime products. Ohio retained the position that it reached in 1922 as the leading state in the manufacture of lime. The growth of the industry in Ohio is due chiefly to the increased output of building lime, most of which is hydrated lime. In Pennsylvania, which was formerly the leading state, there has been during the last few years a decided decrease in the output of lime manufactured for use in agriculture, and no corresponding increase in the sale of lime for chemical and structural uses.

The sales of hydrated lime in the United States in 1923 are estimated at 1,206,000 short tons, an increase of 9% over those in 1922 and the largest yet reported. Of the 31 states that reported an output of hydrated lime in 1923 several showed a small decrease, but the increase in such states as Ohio, Pennsylvania, Missouri, and Virginia kept the sales well above 1,000,000 tons, the production in 1922. The estimated value of the hydrated lime sold in 1923 was $11,824,000, an average value of $9.80 a ton. The average value in 1922 was $8.92.

ECONOMIC CONDITIONS

The reports to the Survey indicate that about the same number of plants were in operation in 1923 as in 1922. Many improvements were made at plants and kilns in order to reduce the cost of labor to a minimum and to increase efficiency. Wages were high, and at times, especially in the summer, common labor was hard to obtain. The cost of operation was generally higher than in 1922, although coal was more plentiful and somewhat cheaper. The manufacturer that sold lime in barrels found that the increase in the cost of the barrels caused a corresponding increase in the cost of lime per barrel. The demand for lime in 1923 was obviously greater than in 1922, but appeared to vary with local conditions and with the use to be made of the product. The average price in 1923 was higher, but many reports show prices about the same as in 1922, or lower.

CONSTRUCTION LIME

The demand for lime for building enterprises was moderately large during the first part of 1923, but the general curtailment of construction work early in the year soon cut down somewhat the demand for lime. On the whole, however, this branch of the lime industry appeared to be prosperous. The increase in sales in 1923 will probably be about 17%.

CHEMICAL LIME

The demand for chemical lime was steadier throughout the year than that for construction lime, and though some manufacturers of chemical lime reported small sales the total sales in 1923 will evidently be more than 1922—possibly 12%. The sales of refractory lime (dead-burned dolomite) amounted to about 395,000 short tons in 1923, as against 348,838 short tons in 1922, an increase of 13%.

AGRICULTURAL LIME

Although some producers reported a considerable demand for agricultural lime in 1923, reports from the chief producing states, including Pennsylvania, Maryland, Virginia, and West Virginia, indicate decreased total sales. The reason given for the decrease in sales is the inability of the farmers to pay the price charged for agricultural lime. Many farmers who burn lime for their own use reported increased output, but the manufacturers of commercial agricultural lime in the same district reported decreased sales. However, the high price of coal, the scarcity of farm labor, and high wages, kept many farmers from burning lime for themselves or their neighbors.

The accompanying table shows the estimated quantity of hydrated lime and the estimated quantity and value of total lime sold in the principal producing states in 1923. The figures for 1922 are given for comparison.

LIME PRODUCED IN THE UNITED STATES IN 1922 AND 1923 (ESTIMATED)

State	1922			1923 (Estimated)				Percentage of Increase or Decrease in 1923	
	Hydrated Lime (Short Tons)	Total Lime		Hydrated Lime (Short tons)	Total Lime		Average Value Per Ton	Hydrated	Total
		Short Tons	Value		Short Tons	Value			
Ohio	537,816	752,916	$6,495,066	596,000	856,000	$8,250,000	$ 9.64	+11	+14
Pennsylvania	172,179	719,536	5,581,794	173,000	750,000	6,255,000	8.34	+ 0.5	+ 4
Missouri	56,024	203,984	1,953,524	64,450	251,000	2,454,000	9.78	+15	+23
West Virginia	49,712	210,146	1,643,055	48,000	243,000	2,111,000	8.69	— 3	+16
Wisconsin	21,680	189,558	1,589,931	20,350	227,600	2,208,000	9.70	— 6	+20
Alabama	15,016	168,135	979,331	14,500	198,000	1,300,000	6.57	— 3	+18
Virginia	15,284	152,436	1,251,683	30,600	175,000	1,350,000	7.71	+90	+15
Massachusetts	(a)	164,980	2,510,368	(a)	172,000	2,687,000	15.62	0	+ 4
Maine	(a)	127,840	1,757,480	(a)	139,000	1,898,000	13.65	— 7	+ 9
Indiana	38,832	113,246	938,645	44,000	128,000	1,152·000	9.00	+13	+13
New York	(a)	96,320	957 079	(a)	127,000	1,300·000	10.24	—12	+32
Tennessee	26,029	126,305	939,039	38 200	124,000	972,000	7.84	+47	— 2
Illinois	13,004	85,425	860,945	15,100	91,000	990·000	10.88	+16	+ 7
Michigan	(a)	53,635	484,945	(a)	80,800	842,000	10.42	—33	+51
Maryland	40,976	71,261	554,194	30,000	66,500	570,000	8.57	—27	— 7
California	(a)	55,161	683,774	(a)	65,000	862,000	13.26	+14	+18
Texas	21,163	52,552	524,985	22,200	62,000	597,000	9.63	+ 5	+18
Connecticut	(a)	52,108	743,742	(a)	59,700	833,000	13.95	+29	+15
Vermont	(a)	44,745	565,498	(a)	52,000	616 000	11.85	—13	+16
Minnesota	(a)	27,670	307,270	(a)	29 700	342,000	11.52	+74	+ 7
Undistributed	98,348	171,658	1,932,691	109,600	159,700	1,824,000			
	1,106,063	3,639,617	$33,255,039	1,206,000	4,057,000	$39,413,000	$9.70	+ 9	+11

a) Included under Undistributed.

Lubrication of the Cement Kiln

By G. S. LaForge
Superintendent, Tidewater Portland Cement Co.

The lubrication of the cement kiln presents one of the many difficult lubrication conditions encountered in a cement plant, which condition, after careful analysis is now efficiently lubricated at a minimum cost, resulting in greatly reducing former power losses, maintenance costs and lubrication costs.

Let us consider what we have to encounter on the bearings and gears of the cement kilns:

1st. Heavy bearing pressures and heavy tooth pressures.

2nd. High bearing temperatures and high temperatures on the gear teeth.

3rd. The presence at all times of dust that has an abrasive, cutting and wearing effect on bearings, besides a cutting and drying out effect on the lubricant used on the gear teeth.

Cement kilns are operated at very slow speeds and it is therefore necessary to employ some means of speed reduction. This is accomplished through a train of reduction gears of the spur and bevel gear type, using cast iron or steel gears for this purpose, effecting slow speed on the pinion driving the girth gear which rotates the kiln.

Another condition to be met is the end thrust, due to the angle at which the kiln operates. This angle or pitch of the kiln is necessary to automatically feed the hot material through the kiln. The end thrust is taken up by guide rollers and thrust collars on the trunnion bearings that support the weight of the rotating kiln, beside overcoming the end thrust of the kiln.

The cement kiln, while in operation, is subjected to high temperatures, due to the burning fuel within. This heat is radiated to the gears and bearings and if this temperature remained constant, lubricating conditions would be greatly simplified. However, such is not the case, as cement kilns are frequently placed in locations where atmospheric temperatures, and very often all elements, are encountered.

Thus we have:

High and low temperatures,
High and low speeds,
Heavy pressures both downward and laterally,
Moisture due to the elements,
Extreme dryness due to the presence of dust and at all times the presence of a penetrating abrasive dust.

In view of the above conditions to be met, it is necessary to classify the lubrication conditions into two classes, namely: gears and bearings.

The trunnion bearings and thrust bearings are of the plain bearing type. Many lubricants are used for this purpose, ranging from cheap black oil to heavy bodied high melting point greases. The top cap of the trunnion bearings is usually provided with sufficient space above the journal to permit the use of grease or of waste and oil. The former is found preferable at all times, inasmuch as the grease, if of the proper quality, will not melt excessively. However, there will be sufficient lubricant working its way through the bearing to prevent dust from entering and at the same time will provide a film of lubricant between the bearing and the rotating thrust collars.

Owing to the clearance between the top cap and the journal on a trunnion bearing, a grease of the proper consistency would leak out excessively and in order to retard this flow of grease, a packing ring of long strand wool yarn waste is packed into the end of the bearing next to the thrust collar. If both ends of the bearings are open, waste is used on both ends, after which bearing is filled with a soft grease, slightly stiffer than vaseline, containing 80% of mineral oil and 20% of soap and fixed oil content, with a melting point of 350° F.

The use of this product on six kilns represents an average consumption monthly of 200 lbs. of grease on 84 bearings and its use has greatly reduced power losses and prolonged the life of our bearings and thrust collars, as there is sufficient grease working through the bearings to prevent dust from entering. Notwithstanding the fact that dust is present on the thrust collars, there is sufficient fluidity to maintain a film of lubricant between the rubbing surfaces.

The use of a proper lubricant for this purpose will maintain uniform lubrication regardless of temperatures, as the lubricant will change but little at low temperatures. No precipitation of residue has been experienced (having reference to soap stock) in the bearings. Therefore, all that is necessary is to keep top caps closed to keep the dust out of the grease and when kilns are down for repairs once a year, to renew yarn packing ring in the bearings.

The lubrication of the reduction gears, driving pinion and girth gears is effected in the following manner:

The base of the reduction gear housing is kept tight so that a heavy viscous lubricant can be retained; then sufficient of the gear lubricant is added to allow the teeth of the larger gears in their lowest position to dip in the lubricant, carrying the lubricant to the gears with which they mesh, hence, the lubricant used on the reduction gears is also used on the girth gears and pinions. The same procedure is followed out on the latter gears, with the exception that the pinion carries the lubricant to the girth gear.

The lubricant that we are using for this purpose is heavy in body, having a viscosity of 1000 seconds Saybolt at 210° F. It is extremely adhesive in nature and will maintain a film of lubricant on the pressure side of the teeth without packing into the root of the teeth any objectionable residue.

It is not affected appreciably by heat or cold and does not harden at low temperatures. It prevents metallic contact on the teeth of the gears, thereby reducing wear and power losses. Even when thoroughly saturated with dust, this material will not pack in the teeth, but will roll off the gears in a condition similar to putty.

When this condition exists, it is necessary to clean out housing and add fresh gear compound, but this is not a frequent occurrence, being only necessary on an average of twice annually.

This lubricant is used on our steam shovel gears, wire ropes and on the gears of our roll crusher with equal efficiency.

Experiences with Kiln Lubrication Vary

The question of proper lubrication for the cement kiln is being given considerable study by cement mill superintendents and while the fundamental principles are the same in all cases, and practically the same difficulties are to be overcome in properly lubricating the kilns in the various plants, local conditions may be considered to have a rather important bearing in each case. An investigation by Concrete taking in a number of mills throughout the country indicates that considerable experimental work and research are being carried on, and as a result of the study given to this particular mill problem, some gratifying results have been obtained from the different lubricants available for use in connection with the kilns.

Some very interesting experience along this line is reported by the superintendent of one cement company where special grease boxes were designed and made up of cast iron with the intention of using wool yarn grease. This was found unsatisfactory as it did not work well on account of the heat. A brick grease without yarn in it similar to that developed by a number of grease companies proved very satisfactory under the conditions and after trying out numerous lubricants recommended, the company settled on the brick grease as standard for kiln lubrication.

The analysis of a grease which has been found very satisfactory by another cement company is as follows:

Moisture	Trace
Fat	72.22%
Water insoluble	4.58%
Water soluble Soap	23.20%
Melting point	175° C
Firing point	254° C

The fat in this grease is anhydrous wool fat, commonly known as wool grease. The water soluble and insoluble soaps are lime compounds with wool grease. No filler is present. This grease gives a very well lubricated surface on the journals, enough oil being present to keep a constant film of oil on the running surface. The consumption of this grease amounted to about 10 lbs. in 30 days.

In another locality, a hard firm grease of high melting point is giving very satisfactory results and although no analysis has been made of the grease, it is apparently a soda soap. The caps on the roller bearings where the grease is used are of the box type and are filled with grease without using waste except across the open end of the bearing, the other end being closed by the end of the brass shell. The grease does not melt even on the bearings at the hot end of the kiln and it is only occasionally that the oilers pour a little black oil on top of it. Two kilns are being operated, involving a total of 32 bearings 8 in. in diameter and about 18 in. long. A barrel of this grease lasts between four and five months. Although the lubricant is rather high priced based on the cost per pound, the results obtained are very satisfactory and from the standpoint of operation, it is considered quite economical.

In one of the cement plants in the east the superintendent reports absolutely no difficulty in properly lubricating the kiln bearings. A high melting point grease is used, this method having been found as satisfactory as any other. The grease used is such as is manufactured by a number of grease or oil companies, six different greases from as many different companies having been tried out and all found to have about the same qualities and to give equally satisfactory results.

On the other hand, the subject of lubrication in the kiln room is one which one of our readers has been unable to work out satisfactorily and for a number of years, the company has been using one grease, simply because it was the best available. The principal trouble in this particular case lies in the fact that the reflected heat in a kiln room is so great that greases which have been tried have invariably dried out after a short time. Tests are now being conducted with a view to finding a grease which will give better satisfaction than the kind used heretofore.

A combination of wool waste and fiber grease is being used in another mill for lubricating the trunnion bearings. While this has been found more satisfactory than anything tried before, it does not altogether answer the purpose, the principal trouble being that the grease next to the shaft has a tendency to harden and glaze over and unless it is stirred up periodically, the shaft is not properly lubricated. Some solid grease is being tried out which promises to give very good results under these existing conditions.

Fiber grease and special roll grease in blocks are being used with good results in a western plant, the roll grease has been found more handy to apply in this particular case.

Pacific Portland Cement Co. Erecting Large Plant on Deep Water

By W. C. Stevenson

The Pacific Portland Cement Co. Consolidated is erecting the first unit of a portland cement plant near Redwood City, Calif., which is about 30 miles from San Francisco. The location is on the main line of the Southern Pacific R. R. and is also on deep water, so as to provide water transportation for raw and finished material, as well as rail transportation.

Materials to be used will be oyster shells mixed with silt and will be excavated by means of a suction dredge from under the waters of San Francisco Bay. The shells are of ancient deposit, small in size and very much disintegrated in their present state. The deposit as formed has nothing but cement making materials in it and hence is ideal for suction dredge excavation. It is intended that this material will be dredged and deposited directly onto a barge and towed to the mill.

For the unloading of the barges the company will use an overhead traveling trolley crane and a grab bucket, so arranged that the material taken from the barge can be deposited directly into the mill bins, or deposited into or taken out of storage, by means of the same crane and bucket.

The present unit of the mill will have a capacity of 2,500 bbls of portland cement per day and is being so built that it will be extended in units of the same capacity to an ultimate capacity of 10,000 bbls. per day.

All grinding will be done by means of compeb mills. The raw grinding mills will have three compartments and the finishing mills two compartments. The mill as designed will be a wet process plant.

There will be two kilns, each 235 ft. long. The first 165 ft. of length will be 10 ft. in diameter and the remaining 70 ft. will be 9 ft. in diameter. These kilns are to be of rigid construction and supported on four carrying rolls. Draft will be maintained by a fan and the gases will be washed before entering the fan to reduce the temperature and at the same time separate as much dust as possible.

The discharge of each kiln will be directly into a rotary cooler 8 ft. diameter by 70 ft. long and the gases used for combustion will be pre-heated in the rotary cooler.

Fuel oil will be used for burning.

The plant will be electrically driven, using current supplied by the Pacific Gas and Electric Co. through a double line directly to the mill. Machine shop, store room, electric repair shop, office and laboratory will be built as a part of this unit of a size sufficient to take care of the larger mill.

All buildings will be of reinforced concrete, with side walls glazed throughout the height and length. These buildings will be of the inverted "U" type construction and no machinery will be supported by the building.

The location of the plant on tide water is such that the entire construction is supported on piles varying in length from 80 ft. to 85 ft. These piles are green timber piles, with a cut-off elevation below water table and concrete construction from the top of the pile up.

Wharves for incoming and outgoing material are being built by Hannah Brothers, San Francisco. Piles are being driven by Duncanson-Harrelson Co., San Francisco. The remainder of the construction work is being done by The Foundation Co., San Francisco. This plant will be in operation during the month of July, 1924.

President of Whitehall Company Dies

William H. Harding, president of the Whitehall Cement Manufacturing Co., Philadelphia, Pa., died recently at his home in that city. He had been connected with the Whitehall company for the past 13 years.

Mr. Harding left a legacy of $25,000 to McDonogh School of which he was one of the first 21 boys who entered the day it opened. He entered the institution an orphan and on graduation began his business career in Baltimore as an employe of the old Consumers' Gas Co. at a salary of $3 a week.

After serving six years with the gas company he became secretary of the Baxter Motor and Manufacturing Co.

Four years later he went to Chicago as manager of two electric light companies, the South Side and the Fort Wayne. Three years later further promotion took him to New Orleans as vice president and general manager of the Louisiana Electric Light and Power Co. The General Electric Co. then made him general agent of its many enterprises in various sections of the country.

Four years later he became president of the Bonneville Cement Manufacturing Co., of Philadelphia, and then he was chosen president of the Coplay Cement Co.

In 1911 Mr. Harding became an official of the Whitehall Cement Manufacturing Co. He was president of this organization at the time of his death. In addition he was vice president of the Interstate Railroad Company and a director of the Corn Exchange National Bank.

Paul C. VanZandt Chief Engineer of Cement Securities Co.

Paul C. VanZandt, formerly chief engineer of the Asano Portland Cement Co., of Japan and who recently returned to the United States, is now chief engineer of the Cement Securities Co. and is located at the Ideal Bldg., Denver, Colo., having assumed the responsibility of the position on March 1. The seven plants of the Cement Securities Co. have a combined capacity practically the same as that of the Asano Portland Cement Co.'s plant in Japan.

Mr. VanZandt left Japan shortly before the earthquake last year, making a tour of various European countries and visiting cement plants in China and Europe before sailing for the United States.

Portland Cement in February

Statistics as to portland cement output in February issued by the Department of the Interior and prepared under the direction of Ernest F. Burchard of the Geological Survey, based mainly on reports of producers of portland cement, but in part on estimates, indicate that production for the month of February, 1924, showed a slight decrease as might have been expected in view of the highest recorded accumulation of stocks and the short month. Shipments showed an upward trend as compared with January, a fact considered as an encouraging evidence of early spring demand.

Production for the month of February is given as 8,588,000 bbls., shipments, 5,933,000 bbls. and stocks at the end of February 16,811,000 bbls.

The Bureau of Foreign and Domestic Commerce, of the Department of Commerce, reports that the imports of hydraulic cement in January, 1924, amounted to 153,732 bbls., valued at $250,799. The total imports in 1923 amounted to 1,678,636 bbls., valued at $2,964,098. The imports in January were from Belgium, 56,489 bbls.; Denmark, 55,982 bbls.; Norway, 36,394 bbls.; Sweden, 2,681 bbls.; France, 1,281 bbls.; Canada, 899 bbls.; Italy, 6 bbls. The imports were received in the following districts: Porto Rico, 55,982 bbls.; Los Angeles, 49,001 bbls.; Florida, 13,607 bbls.; New York, 11,456 bbls.; Washington, 10,127 bbls.; New Orleans, 9,073 bbls.; South Carolina, 4,474 bbls.; St. Lawrence, 6 bbls.; Massachusetts, 6 bbls.

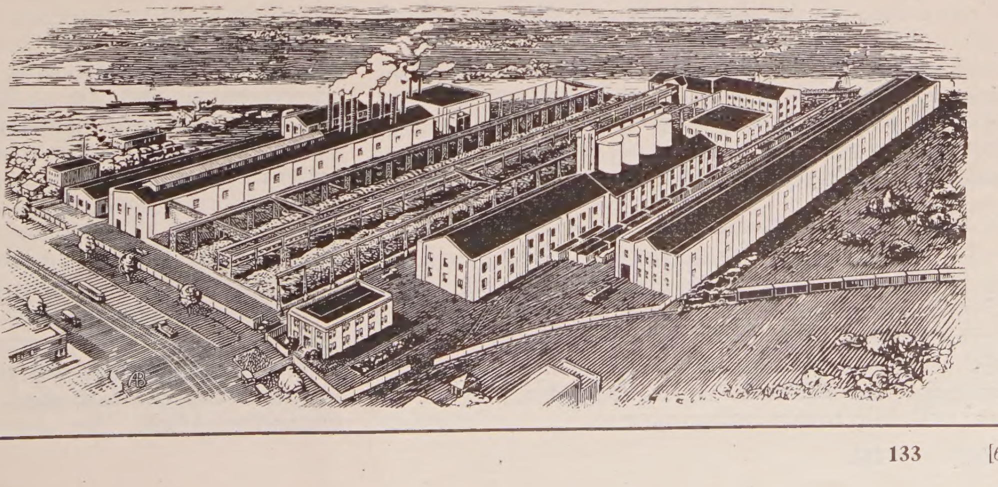
The exports of hydraulic cement in January, 1924, were 88,586 bbls., valued at $252,497, of which was sent to Cuba, 50,412 bbls.; to the other West Indies, 8,810 bbls.; South America, 15,117 bbls.; Mexico, 6,119 bbls.; Central America, 4,595 bbls.; Canada, 584 bbls.; and to other countries, 2,949 bbls.

Lime Convention at White Sulphur Springs

The National Lime Association will meet for its 1924 Convention on May 20, 21 and 22 at the Greenbrier Hotel, White Sulphur Springs, West Virginia. The program will include not only a report of the activities of the Association and addresses by men prominent in the lime industry, but there will also be scheduled certain special features, such as a golf tournament to add to the general interest. Lime manufacturers and all interested in the lime industry are urged to attend.

New Peerless Cement Plant

REPRODUCTION OF A DRAWING OF THE PEERLESS PORTLAND CEMENT CO'S NEW PLANT BEING BUILT ON A 14-ACRE TRACT IN THE INDUSTRIAL SECTION OF DETROIT, MICH. THE CAPACITY WILL BE 28,000 SACKS PER DAY.



Men and Mills

Notes from the Field

During the month of April there will be several "No Accident Month" campaigns in force. The Pensylvania Cement Co. will have its plants at Bath, Pa. and Portland Point, N. Y. compete for the honor of having the least or no accidents during that month.

W. D. Armstrong has been appointed superintendent of the Exshaw, Alta., plant of the Canada Cement Co., Ltd.

The two big kilns of the Louisville Cement Co. have started work again, all repair work and new construction having been completed in the crusher room, raw grind room, coal house and power plant. It was expected that work would be completed on the four small kilns, so all six would be turning out cement before the end of March.

Word has been received from W. H. Green, to the effect that he expects to arrive in the United States some time in June after spending three years in India, erecting and operating a large cement plant for the Jubbulpore Portland Cement Co., Ltd. The plant is equipped with Allis-Chalmers machinery throughout and is one of the most modern in India.

The plant of the Peerless Portland Cement Co. in Union City, Mich., is now under full and complete operation for the season of 1924, and with notable improvements made upon the equipment. A new Westinghouse 750 k.w. turbine generator has been installed, which increased the power from 1500 h.p. to 2500 h.p. The entire mill has been equipped with electric motors, thus doing away with the old cable drive which previously operated a portion of the machinery. Other notable improvements have been made, including the installation of two new Bates packers. A new device for loading cars with sacked cement has also been devised, with very satisfactory results. Last year the plant produced something more than a half million barrels of cement and this year it is expected the output will be increased to nearly three-quarters of a million barrels.

The Dixie Portland Cement Co. has removed all first-aid kits from its plant and no first-aid is allowed on the job. A doctor is always available within 10 minutes time in case of accident.

The Northwestern States Portland Cement plant closed for repairs about the middle of March, but none of the employes will be laid off during the three weeks that will be required to go over the entire plant and make general repairs, officials of the company announced.

A report from Bonner Springs, states that work is progressing rapidly on the new two million dollar plant of the Kansas Portland Cement Co. According to Superintendent Loveland, the plant is now about 60% completed. The steel is all set for the raw mill buildings and workmen are setting machinery in the coal mill, kiln rooms and warehouse.

Reports presented at the annual meeting of the stockholders of the New Egyptian Portland Cement Co., indicate the company had a very satisfactory season in 1923 and that the outlook for 1924 is very favorable.

The company is commencing the installation of another unit at Port Huron, Mich., which will increase daily output from its two plants to 5000 bbls.

The directors elected officers as follows: president and general manager, Maynard D. Smith; vice president and general sales manager, E. R. Sullivan; secretary and treasurer, C. A. Bray; assistant general manager, John A. Acker.

The Egypt and Reliance plants of the Giant Portland Cement Co. have recently been put into operation after having been shut down for repairs. Indications continue to presage a very busy spring for all the mills in the Lehigh district.

The Wolverine Portland Cement Co., in its financial statement for the year ending December 31, reports that during the year the company produced 650,000 bbls. of clinker which is the second largest year's production in the history of the company. Owing to favorable weather conditions, the company's plant were operated till December 21 and it is reported that the demand for cement is greater at this time than it was a year ago and that prices are about the same.

Fritz Worm of La Salle, Ill., will erect a new cement plant near La Salle, this spring, according to reports from Illinois. The company of which Mr. Worm is president is the Red Star Cement Co.

The Newaygo Portland Cement Co.'s plant reopened about the middle of March, after a winter shut down with a program that calls for 750,000 bbls. for the season, a considerable increase over last season. The Newaygo company held its annual banquet for employes in McCool hall recently, covers being laid for 160.

The Colorado Portland Cement Co., is just completing a 12-bin cement storage of 200,000 bbls. capacity and has completed a 4-story and basement packing house. The entire trackage in the company's yards is to be rearranged and laid with heavy steel. The company has installed a shovel of over 100 tons on caterpillar treads which has proved a revelation, and according to E. J. Strock, superintendent, it will not be long until shovels of over 100 tons on caterpillar treads will be "all the rage."

The new plant of the Hermitage Portland Cement Co., Nashville, Tenn., started in operation March 25 according to an announcement made by R. T. Miller, general manager. The first kiln of the $1,000,000 plant was started March 21 and the plant is turning out cement at the rate of 900 bbls. a day. The full capacity is 2000 bbls. per day.

The cement plant embodies all up-to-date details in cement manufacture. As soon as the plant is put on a full operation basis an invitation will be extended to officials of the LaFarge Cement Co. of France to inspect the plant, the Frenchmen having requested permission to send a commission here to look over the modern facilities of the plant.

R. B. Koons, general superintendent of the Wolverine Portland Cement Co., died suddenly on March 8 at Coldwater, Mich.

At a recent meeting of the stockholders of the Signal Mountain Portland Cement Co. the directors were authorized to proceed as rapidly as possible with the installation of the third and fourth units in order to bring the output of the plant up to 5,000 bbls. per day, for which the mill is designed. Officers elected were: W. A. Sadd, chairman of the board; John L. Senior, president; C. S. Steward and J. L. Caldwell 1st and 2nd vice presidents respectively; J. P. Hoskins, secretary and treasurer; M. L. Carter, assistant treasurer and P. S. Steward, assistant secretary.

Thomas L. Thomas, resident of North Catasauqua, Pa., and for 25 years an employe of the Atlas Portland Cement Co., Northampton, died recently from shock due to a fall.

At the annual meeting of the stockholders of the Lehigh Portland Cement Co., the following directors were elected: General Harry C. Trexler, Edward M. Young, George K. Mosser, John D. Ormrod and Daniel E. Ritter, all of Allentown.

The plant of the Edison Portland Cement Co. at New Village has been slightly damaged by a fire which started in a room used by employes for changing their clothing. The room was burned out but the flames were extinguished before any damage was done to the remainder of the plant.

The Oklahoma Portland Cement Co.'s plants at Ada, Okla., are making preparations for an April "No Accident" campaign. They are busy on accident prevention work at Ada. One of their latest undertakings is a plant publication. The first issue came off the press January 31. For a start the name is Safety First Bulletin, but it will be renamed. The company has offered a prize to the employe who offers the best name for the baby.

The last week of last year, the Dixie Portland Cement Co., had a safety slogan contest, stipulating that slogans submitted should contain the words "Safety" or "Be Careful." The man writing the best slogan in his department was awarded a pair of $6.50 shoes and the one writing the best slogan of all was awarded a $45 suit of clothes. This prize was given to Mitch Welsh of the packing department for his slogan, "Preach Safety and Practice What You Preach."

The Sun Portland Cement Co., whose new plant is at Lime, four miles west of Huntington, Ore., has started the erection of a second unit of 1100 bbls. daily capacity, according to announcement attributed to George Macdonald of Portland, vice president. Machinery and equipment have been ordered and construction is under way, the new unit to be in operation early next fall.

The first unit of this company's plant was opened early last November and soon demand for the cement came up to production capacity. The output will be doubled, and it is expected that there will be enough business from the region east of the Cascade mountains and in Southern Idaho, as well as from Portland and its vicinity, to keep the cement plant in continuous operation.

The Sun Portland Cement Co. will manufacture also waterproof plastic cement, which will be sold at a price only slightly higher than ordinary cement.

H. L. Knappenberger, who learned the practical side of cement production in famous Lehigh Valley, Pennsylvania, will continue as manager of the Eastern Oregon cement plant which will have double the capacity of any other similar plant in the state, according to the announcement.

Two factors in determining the directors to build another unit were the obtaining of a satisfactory rate for electric power from the Idaho Power Co. and the granting by the O.-W. R. R. & N. Co. of a low railroad freight rate on cement from Lime to the Portland market.

The Sun company's office is in the Porter Bldg., Portland, with C. T. W. Hollister in charge as secretary and sales manager.

An order for 1200 tons of steel for a building for the Pacific Portland Cement Co. at Redwood City, was received recently by the McClintic-Marshall Co. of New York. Structural demand in the middle West and on the Pacific Coast is unusually large.

The first large movement of cement to Portland from Europe arrived recently on the Norwegian motorship Borgaa, bringing 2000 tons according to reports from Oregon.

Portland Cement Ass'n. to meet in Los Angeles

The spring meeting of the Portland Cement Association will be held in Los Angeles this year, May 20 to 22 inclusive.

Wabash Portland Cement Co. Plans New Plant

The Wabash Portland Cement Co., with works at Stroh, Ind., and head office at Detroit, Mich., has announced that a 1000-acre tract of land has been purchased about 10 miles from Dayton, O., and that plans are being arranged for a cement plant to have a capacity of at least 1,000,000 bbls. per year.

While it is not definitely decided whether the wet or dry process will be used in manufacturing cement, it is planned to make the new plant the most modern in every respect and the cost of the plant has been roughly estimated at $1,750,000. It is expected to start construction work immediately after the plans are concluded.

Work Started on New Clinchfield Plant

Ground has been broken for a new $1,000,000 wet process cement plant, for the Clinchfield Portland Cement Corp. of Kingsport, Tenn., which will be located at Coreen, near Macon, Ga., according to reports from the Southern district.

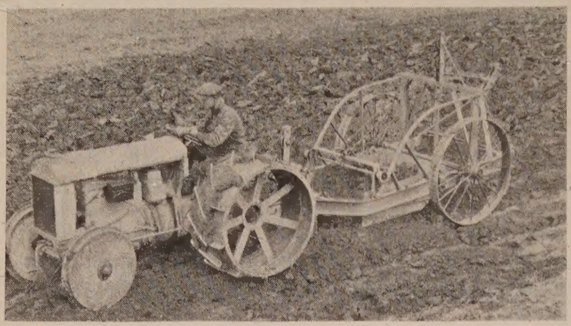
The plant will be modern in every respect, with buildings of concrete and steel construction and all units equipped with individual electric motor drives. The design has been worked out with the idea of allowing plant expansion for increased output when justified by existing trade conditions and with a minimum disturbance of operating program.

A site on the Georgia Southern & Florida Division of the Southern Ry. was acquired last year and since then plans have been prepared for the new plant.

The officers of the Clinchfield Portland Cement Co., include: John A. Miller, president; H. R. Dennis, vice president; E. G. Woodling, secretary; Morris M. Hunter, sales manager and F. Guenther, Jr., general manager.

Miami Trailers

The accompanying illustration shows the Miami Fordson One-man power scraper for stripping operations and moving dirt in general. It can be used in grading streets, digging clay, road building and general contracting work.

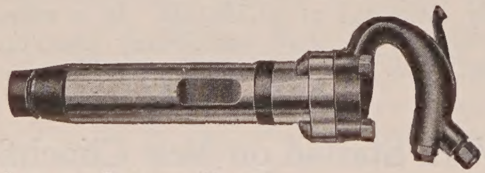


Miami Fordson Scraper

It is claimed, where this equipment is used on a haul of 200 ft. or 400 ft. round trip, the unit will deliver a load of dirt every two minutes, depending upon general conditions. Taking an average of 2½ minutes to a single trip, it would load, transport and dump 19 cu. ft. of earth per trip, or 17 cu. yds. per hour, at a cost of only 5 cents per yd.

New Type Riveting Hammer

The Ingersoll-Rand Co., 11 Broadway, New York City, has developed a new type of pneumatic riveting hammer with many improved and economical features. This hammer has been thoroughly tested on all classes of work.



Improved Riveting Hammer

The outstanding features claimed for this new riveter include bolted construction for holding the handle to the barrel, heavy section valve with liberal bearing surfaces; combination poppet and piston type throttle valve; power in excess of all ordinary requirements; low air consumption and exceptionally easy operation. The control is sensitive, ranging from a light tap to a heavy blow, entirely at the will of the operator.

The foundations for three large cement storage bins have been completed at the plant of the Coplay Cement Manufacturing Co.

Ten cement silos are being erected by the Lawrence Portland Cement Co. at Northampton.

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912.

Of Cement Mill Edition of Concrete, published monthly at Detroit, Michigan, for April 1, 1924.

State of Michigan, } ss.
County of Wayne, }

Before me, a Notary Public in and for the State and County aforesaid, personally appeared R. Marshall, who, having been duly sworn according to law, deposes and says that he is the General Manager of the Cement Mill Edition of Concrete, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in Section 443, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor and business managers are:

Publisher—Concrete-Cement Age Pub. Co., Detroit, Mich.
President—R. Marshall, Detroit, Mich.
Managing Editor—Harvey Whipple, Detroit, Mich.
General Manager—R. Marshall, Detroit, Mich.

2. That the owners are (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock):

Concrete-Cement Age Pub. Co. 1807 E. Grand Blvd. Detroit, Mich.
R. Marshall, 1807 E. Grand Blvd., Detroit, Mich.
Harvey Whipple 1807 E. Grand Blvd., Detroit, Mich.
F. F. Lincoln, Room 1710, 115 Broadway, New York City.
R. N. Jackson, 1807 E. Grand Blvd., Detroit, Mich.
R. W. Lesley, Pennsylvania Bldg., Philadelphia, Pa.
Edward B. Bruce, Manila, P. I.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholders or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers, during the six months preceding the date shown above is———. (This information is required from daily publications only.)

R. MARSHALL,
Manager.

Sworn to and subscribed to before me this 28th day of March, 1924.
(Seal.) PERSIS E. HILL.
(My commission expires August 18, 1924.)

Trade Publications

The Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has recently issued a new 20-page publication, Circular No. 1670 entitled *Static Condensers for Power Factor Correction.* The circular is 8½ in. x 11 in., illustrated.

In this circular the need for power factor correction and the methods of obtaining high power factor are discussed. The method of selecting the proper corrective device for power factor is carefully analyzed, and the fields of application of synchronous and static condensers set forth in diagrammatic form.

A complete illustrated description of Westinghouse Type LD static condensers with wiring diagrams for two and three phase equipment is included in the circular. The method of calculating the corrective kv-a. necessary for an installation of condensers and a chart for determining the percent of reactive kv-a. required to raise the power factor to a desired value are next presented. A tabulation of the weights, dimensions and losses of static condensers and the weights and dimensions of transformers conclude the information given.

High Voltage Porcelain Insulators—Their Design and Manufacture, is the title of a 56-page booklet known as S.P. 1690, issued by the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., for the purpose of presenting to engineers responsible for the design, installation and maintenance of high-voltage transmission systems, information describing the design and manufacture of porcelain insulators. The publication is so comprehensive that it is essentially a text book on the subject of high voltage insulators.

The booklet opens with a short chapter on the development of the art of pottery, which is followed by a description of the various manufacturing processes used in making porcelain. A succeeding chapter gives technical data on the experienmtal investigation of porcelain mixes.

A study of the design of high voltage insulators is next included, first from the standpoint of electrical theory and then from that of ceramic principles. This is followed by a very complete chapter concerning the design of pin-type insulators, with photographs, sketches and drawings illustrating all the points included. A similar chapter on suspension insulator design and a brief description of the Westinghouse million-volt laboratory concludes the booklet.

WANTED—Two good general cement plant repairmen. Georgia Cement & Stone Co., Portland, Ga.

POSITION WANTED by high class experienced cement chemist. Twenty years successful experience in dry and wet process operation. Has executive ability and familiar with all details—operation, investigation of new properties and their commercial values. Highest references. Address Box 1553, c/o CONCRETE, 1807 E. Grand Blvd., Detroit, Mich.